

Mentoring and Inquiry using NASA Data on Atmospheric and Earth Science for Teachers and Amateurs

The MY NASA DATA Project, part of NASA's Research Education and Applications Solutions Network, works to make NASA Earth Science data accessible to the K-12 and citizen scientist communities. The principal activity of the project is to create "microsets" from large scientific data sets, and to wrap these with tools, lesson plans, and supporting documentation so that a teacher can use the information in the classroom. In addition, the project offers an e-Mentor network through which teachers and students can submit and get answers to scientific and pedagogical questions related to the data and its use in educational and scientific projects.

A main goal of the MY NASA DATA project is to remove the barriers (such as file size and format, and complicated computer tools) that prevent the use of authentic NASA Earth system science data in the classroom or by the interested public. Microsets may be a single parameter for the whole globe, or a time series for a single location, and they may be static or made on the fly as students explore a topic. Parameters are available on the Earth's atmosphere, cryosphere, hydrosphere and surface, and more continue to be added.

MY NASA DATA and K-12 Teachers

A growing collection of lesson plans helps teachers to incorporate authentic data use in their classrooms. Teachers are also invited to submit lesson plans they develop to make use of MY NASA DATA resources.

MY NASA DATA and Citizen Science

Sample project ideas are being developed that may be of interest to citizen scientists, which are broadly defined in this project to include middle and high school students doing science fair projects. Project ideas and reports of completed projects can also be submitted for inclusion on the MY NASA DATA website.

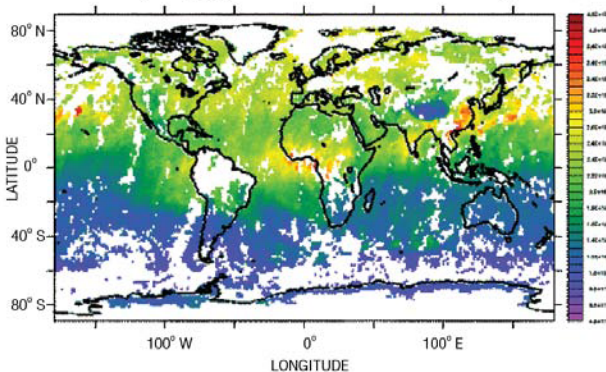
MY NASA DATA Team Members

MY NASA DATA is lead by the Science Directorate at NASA Langley Research Center, working with a team from the Atmospheric Science Data Center.

For more information, visit:
<http://mynasadata.larc.nasa.gov>
 Email: mynasadata@lists.nasa.gov

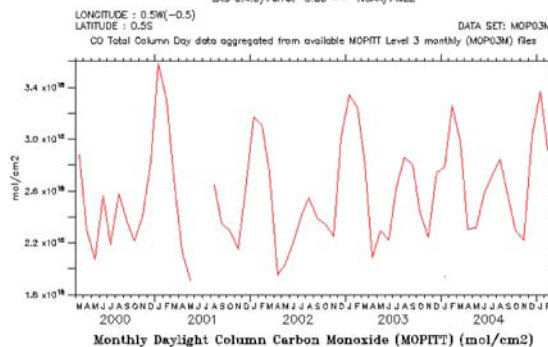
LAS 6.4.0/Ferret 5.80 -- NOAA/PNEL

TIME : 15-MAR-2000 00 DATA SET: MOPQ3M
 CO Total Column Day data aggregated from available MOPITT Level 3 monthly (MOPQ3M) files



Monthly Daylight Column Carbon Monoxide (MOPITT) (mol/cm²)

LAS 6.4.0/Ferret 5.80 -- NOAA/PNEL



Monthly Daylight Column Carbon Monoxide (MOPITT) (mol/cm²)

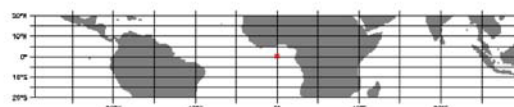


Figure 1: Examples of data exploration that can be done using the Live Access Server of the MY NASA DATA website.

Solar Declination and Cloud Cover, Are They Related?

Purpose: To use NASA satellite data to correlate cloud cover to the solar declination.

Grade Level: 9-12

National Standards:

- Science Content: A Science as Inquiry
- Science Content: D Earth and Space Science
- Science Content: E Science and Technology

Estimated time to complete the activity: One 50 minute class period

Learning Outcomes

- Access NASA data using the Live Access Server
- Relate seasonal patterns to cloud formation
- Identify the relationship between solar declination and the four seasons

Procedure:

1. On the main web page, under Data Access, click link to [Live Access Server](#)
2. Click on [Atmosphere](#)
3. Click on [Clouds](#)
4. Click on [Cloud Coverage](#)
5. Select Monthly Cloud Coverage (ISCCP)
6. Click on the **NEXT->**, this is located on the right side of the page
7.
 - a. In the [Select view](#) drop-down menu highlight Latitude-time hofmoeller (yt)
 - b. In the [Select output](#) drop-down menu highlight Color plot
 - c. In the [Select region](#) drop-down menu highlight Full Region
 - d. The coordinates' box is shaped like a compass.
 - In the North position's box type 30 N. This sets the northern boundary for the plot.
 - In the South position's box type 30 S. This sets the southern boundary for the plot.
 - In the East position's box type 23 E and press Enter on your keyboard. This will automatically set the corresponding West position's box with the same value of 23 E.
 - If there is a Go button, click the button.
 - e. [Select time range](#): select 15 Jan 1995 to 15 Dec 1995.
8. Click on the **NEXT->**, this is located on the right side of the page.
9. A plot like Fig. 2 will appear in a new pop up window.

Extensions:

- Explain the relationship between observed cloud cover, solar declination and the seasons.
- Relate cloud formation to expected local weather.
- Explore the impacts of the wet and dry seasons in Africa.

Complete lesson plans and other examples using MY NASA DATA are available at <http://mynasadata.larc.nasa.gov>

Background The four seasons on Earth have a scientific basis. The Earth is tilted 23.5° from vertical. It is this tilt and the Earth's elliptical orbit around the Sun that are the causes of the seasons. The angle at which the sun's rays hit the surface of the Earth is the reason for the fluctuating lengths of daylight during the year. However, around the equator the sun is practically overhead year round. The solar declination is the latitude at which the sun is directly overhead at solar noon. The solar radiation causes the warmed air to rise, forming clouds. The formation of these clouds follows the solar declination due to the changing direction of the Sun's rays. In the tropics it is easier to observe the affects of solar declination on the location of cloud formation. Figure 1 shows how the solar declination changes over the calendar year. Figure 2 is the graphic that is produced when the procedure is followed. It shows how cloud coverage over tropical Africa changes over the calendar year.

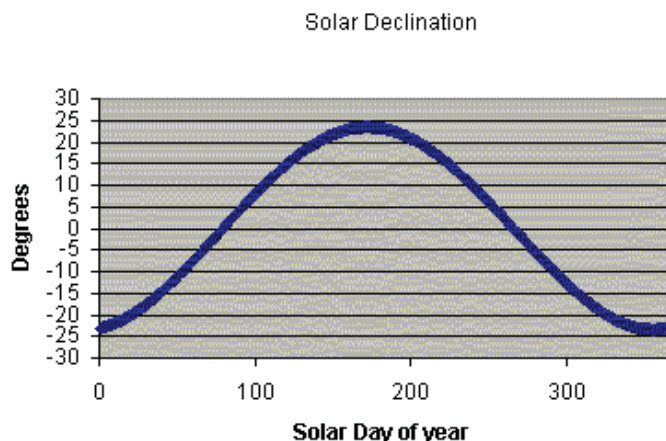


Figure 1. Solar Declination over the Calendar Year

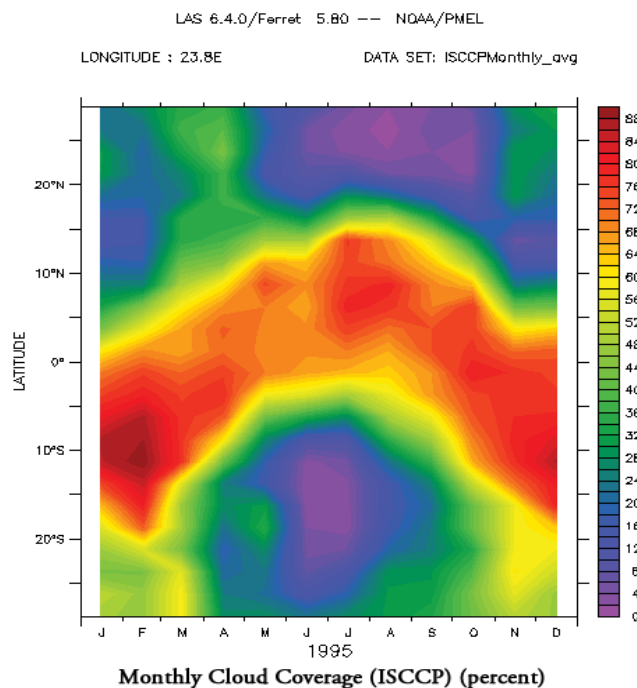


Figure 2. Cloud Coverage over the Tropics throughout the Calendar Year (1995)